

# TEMPORAL VARIATIONS OF CARBONACEOUS AEROSOL CONCENTRATIONS AND SOURCES IN THE METROPOLITAN AREA OF KRAKOW, POLAND

Magdalena Kistler<sup>1</sup>, Katarzyna Styszko<sup>2</sup>, Katarzyna Szramowiat<sup>2</sup>, Janusz Golas<sup>2</sup>, Anne Kasper-Giebl<sup>1</sup>

1 Institute of Chemical Technologies and Analytics, Vienna University of Technology, Vienna, Austria

2 AGH University of Science and Technology, Department of Coal Chemistry and Environmental Sciences, Krakow, Poland

Although the air quality in the European Union undergoes strict regulations, many places still suffer from high particle concentrations. Krakow, the second largest Polish city, is ranked 136 among the most PM<sub>10</sub> polluted cities in the world (WHO, 2011). Long term observations of the size and chemical composition of particles are therefore required to gain information about the origin of pollution. This contribution comprises data collected between 2013 and 2015 at three different sites, within the Krakow metropolitan area. The properties of carbonaceous aerosols are analyzed, in order to describe the origin of the particles.

Sampling was conducted at three sites located in the city center of Krakow, in Skawina - an industrial town at Krakow suburbs, and in Bialka - a rural background site, located 60 km to the South. PM<sub>10</sub> and PM<sub>2.5</sub> were collected simultaneously on quartz fiber filters (Pall, 47mm), using low volume samplers. Samples were taken within nine campaigns and represent a period between January 2013 and February 2015, including both winter and summer season.

PM mass was determined gravimetrically. Carbon parameters (OC/EC) were measured using a thermal optical method (Sunset Inc.). For quantification of major inorganic ions and saccharides different ion chromatography systems (Thermo Scientific) were used.

The average PM<sub>10</sub> concentrations range between 58 and 81 µg/m<sup>3</sup> in the cold season (exceeding the permitted value on most days), and between 15 and 22 µg/m<sup>3</sup> during warm period (showing no exceedances). PM<sub>10</sub> to PM<sub>2.5</sub> ratios average from 1.1 and 2.4 and vary between sites and seasons, pointing to differences in chemical properties of aerosols. The OC/EC ratios are similar for both size fractions, indicating that most of carbonaceous particles are related with PM<sub>2.5</sub>. The OC/EC values of around 5, observed at the rural background site, point to the influence of secondary organic aerosols. In contrast, the high share of total carbon (TC) in PM<sub>10</sub> (74%) at the industrial site suggests a strong influence of local carbon sources.

## References

WHO, 2011: accessed at 27.04.2015

[http://www.who.int/phe/health\\_topics/outdoorair/databases/cities-2011/en/](http://www.who.int/phe/health_topics/outdoorair/databases/cities-2011/en/)

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